**Remarks**

The applicants have corrected an incorrect reference numeral in the specification. Claim 1 has been amended to state clearly that the structure is either epitaxial or formed by the fusion of separate wafers. This amendment is supported, for example, by the passage on page 11, lines 8 – 13.

The Examiner has rejected claims 1 to 21 over Liu in view of Elabd under 35 USC 103(a).

The question arising under obviousness in respect of claim 1 is relatively straight forward. Liu shows an integrated arrangement comprising a photodetector and LED, but as correctly noted by the Examiner fails to disclose the avalanche multiplier.

Elabd shows an imaging device wherein a selenium layer 12 provides avalanche gain for the photoconductive layers forming part of a photodetector. There is no teaching that this device could or should be integrated with a light emitting device. Moreover, such a device, which uses selenium and silicon would be completely incompatible with III-IV systems, as defined in claim 4, for example.

The inventors say that while the individual devices are known *per se*, the fact that they could be integrated into a single device is far from obvious and results from an in-depth understanding of how the devices work and how they can work together to achieve the overall desired function of providing wavelength conversion and detection. The inventors say that without having undertaken extensive research, one skilled in the art would not have put the devices together into an integrated device and expected it to work. The inventors have found, surprisingly, that the devices can be made to work using either epitaxial or fusion techniques as now specified in the independent claims.

The Examiner states that it "would be obvious to the person of ordinary skill in the art to have included an avalanche multiplier like that of Elabd in the Liu integrated converter structure". Firstly, it is pointed out that the Federal Circuit has stated has clearly rejected the "obvious to try" test as being a valid test for obviousness:

> "We have criticized the "obvious to try" test on several recent occasions...
>
> Application of the "obvious-to-try" test would often deny patent protection to inventions growing out of well-planned research which is, of course, guided into those areas in which success is deemed most likely. These are, perhaps, the obvious areas to try. But resulting inventions are not necessarily obvious. Serendipity is not a prerequisite to patentability. Our view is that the "obvious-to-try" is not a sufficiently discriminatory test" *In re Lindell* 155 USPQ 521.

According to the inventors it is by no means obvious that it would be possible to construct a working device containing three integrated component structures in a stacked arrangement; on the contrary according to the inventors one skilled in the art would be very surprised that such a structure would work. The fact that two devices work in this way as disclosed in Liu is surprising in itself, and the fact that three devices can be made to work is completely unexpected.

Moreover, there is no disclosure in the prior art of the use of an avalanche multiplier for the purpose of amplifying the current driving a light emitting device. Elabd only discloses the use of a multiplier for the purpose of amplifying the detection current in a photodetector. The detection current in this context is the current applied to an electronic circuit for further electronic processing. The current produced by the photodetector in the invention is not the detection current, but rather the drive current for the LED. The current produced by the photodetector if the present invention is never applied to an electronic circuit as in Elabd, and therefore is not a detection current as contemplated by

Elabd. If one considered the teachings of Elabd in the context of Liu, they would apply to the CCD detector receiving the converted output of the LED. The idea of using an avalanche multiplier within a stacked integrated structure to increase the drive current to an LED is not something that is contemplated or suggested in the prior art and requires an insight that is clearly not suggested in the prior art. It is well established in order to sustain a *prima facie* obviousness rejection, all of the claimed limitations must be found or suggested in the prior art.

The Examiner, cognizant of the need to show motivation, appears to give as motivation the fact that "such a multiplier would amplify the photocurrent generated by the photodetector so that driving the LED would be more efficient". However, the courts have repeatedly pointed out that the motivation to combine must be found in the prior art teaching, not in the applicant's teachings. The Examiner has failed to cite any prior art showing the desirability of amplifying the current supplied to an LED so that "driving the LED would be more efficient". Such an assertion requires an understanding of the carrier generation and transfer within an integrated structure as claimed, and is certainly not apparent from the prior art of record. The Examiner refers to the "disclosed importance of light amplification in a detection apparatus", but this would argument, at least based on prior art teachings, would apply to the detector receiving the light from the LED in Liu, not to the current driving the LED *per se*. There is no disclosure of in the prior art of the importance of amplifying a current driving an LED. This requires insight not suggested in the prior art. Such rejection is therefore respectfully additionally traversed as failing to show adequate motivation in the prior art.

With particular regard to dependent claims 6 and 7, it is noted that Elabd discloses selenium for the avalanche gain layer. There is not disclosure of such a device using InP layers, and the Examiner's statement that "any avalanche structure .. would also likely comprise InP and InPAs layers" is pure speculation unsupported by any prior art showing. The fact that a single *working* integrated structure can be formed of such layers as claimed is in fact a very surprising result, not obvious at all to a person of ordinary skill in the art. Similar arguments apply to claim 9.

In summary, while the components of the invention are known individually in the prior art, it is respectfully submitted that it is not obvious they could, or even should, be integrated into a working device as demonstrated by the inventors.

Reconsideration and allowance are therefore respectfully requested.

Respectfully submitted,

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